REMARKS

In response to the above-identified Final Office Action ("Action"), Applicants traverse the Examiner's rejection to the claims and seek reconsideration thereof. Claims 1 and 3-23 are pending in the present application. Claims 1 and 3-23 are rejected. In this response, claims 1 and 18 are amended, claim 12 is cancelled, claims 20 and 21 are withdrawn and no claims are added.

I. Claim Amendments

In the instant response, claims 1 and 18 are amended. Claim 1 is amended to incorporate the limitations of now cancelled claim 12. Claim 18 is amended to recite that the film of gallium nitride is "obtained" instead of "able to be obtained." Applicants respectfully submit the amendments are supported by the specification and do not add new matter.

In view of the foregoing, Applicants respectfully request consideration and entry of the amendments to claims 1 and 18.

II. Withdrawn Claims

Claims 20-21 are withdrawn from consideration.

III. Claim Rejections – 35 U.S.C. §102

In the outstanding Action, the Examiner rejects claims 18-23 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,325,850 issued to Beaumont et al. ("Beaumont"). Applicants respectfully traverse the rejection.

In regard to claims 20 and 21, claims 20 and 21 are withdrawn from consideration therefore the rejection of the claims on this basis is moot.

In regard to claims 18, 19, 22 and 23, claims 18, 19, 22 and 23 depend from claim 1 and incorporate the limitations thereof. For at least the reasons that will be discussed in more detail below regarding claim 1, Beaumont fails to teach at least the elements of "a spontaneous separation step at the weak area to obtain the self-supported film of gallium nitride, wherein the

spontaneous separation at the weak area is implemented by return to ambient temperature after the resumption of epitaxy" as further found in claims 18, 19, 22 and 23. Thus, regardless of whether claims 18, 19, 22 and 23 are product-by-process claims (and Applicants do not believe this is the case), since the cited art fails to teach all of the elements of the product, anticipation may not be established. Applicants respectfully request reconsideration and withdrawal of the rejection of claims 18, 19, 22 and 23 under 35 U.S.C. §102 over Beaumont.

IV. Claim Rejections – 35 U.S.C. §103

In the outstanding Action, the Examiner rejects claims 1 and 3-23 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,723,165 issued to Ogawa et al. ("Ogawa") in view of U.S. Patent No. 6,325,850 issued to Beaumont et al. ("Beaumont") and further in view of U.S. Patent No. 6,303,405 issued to Yoshida et al. ("Yoshida") or International Publication No. WO 01/93325 issued to Aspar et al. ("Aspar"), where U.S. Patent Publication No. 2003/0077885 is used as an accurate translation. Applicants respectfully traverse the rejection.

To establish a *prima facie* case of obviousness, the Examiner must set forth "some articulated reasoning with some rational underpinning to support the conclusion of obviousness." See *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1396 (2007). In the case where the Examiner relies upon the rational of applying a known technique to improve a similar device, the Examiner must show that the results would have been predictable to one of ordinary skill in the art. See *Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103*, Section III(D), issued by the U.S. Patent and Trademark Office on October 10, 2007.

Claim 12 is cancelled and claims 20 and 21 are withdrawn therefore the rejection of these claims on this basis is moot.

In regard to independent claim 1, Applicants respectfully submit the combination of Ogawa, Beaumont, Yoshida and Aspar may not be relied upon to teach at least the elements of "a step of reworking by epitaxial lateral overgrowth (ELO) in order to form a new layer of GaN" and "a spontaneous separation step at the weak area to obtain the self-supported film of gallium

nitride, wherein the spontaneous separation at the weak area is implemented by return to ambient temperature after the resumption of epitaxy" as recited in claim 1.

Ogawa generally discloses a method for fabricating a GaN semiconductor substrate. With reference to Figure 9A-9F of Ogawa, one embodiment of the method comprises the following steps:

- growing of a GaN layer 65 on a substrate by HVPE (see Ogawa Figure 9A and column 19 lines 7-21),
- implanting of protons H+ on the GaN layer 65 for forming an implanted GaN region 66 having numerous defects (see Ogawa Figures 9B and 9C, and column 19 lines 22-31),
- growing of a second GaN layer 67 by HVPE (see Ogawa Figure 9D and column 19 lines 32-40),
- scanning the GaN layer 65 through the substrate, thus decomposing the lower portion of the GaN layer 65 in order to separate the implanted GaN region 66 from the GaN layer 65 (see Ogawa Figure 9E and column 19 lines 49-67),
- obtaining a GaN substrate composed of the upper portion of GaN layer 65 and of the second GaN layer 67 (see Ogawa Figure 9F and column 19 line 67).

Thus, as admitted by the Examiner on page 4, paragraph 4 of the Action, Ogawa does not describe a step of reworking by epitaxial lateral overgrowth (ELO) in order to form a new layer of GAN, as provided in claim 1.

In addition, Ogawa does not disclose the step of spontaneous separation, at the weak area, by return to ambient temperature after the resumption of epitaxy to obtain a self supported film of GAN as further recited in claim 1

On the contrary, in regard to the element of spontaneous separation, Ogawa discloses a separation technique using a laser beam (see Figure 9E and column 19 lines 49-66). In regard to the element of separation at the weak area, Ogawa discloses separating a GaN film above the implanted GaN region (see Figure 9E and 9F) since the laser beam allows for decomposing of the lower portion of the GaN layer 65 but not the implanted GaN region 66 (see column 19 lines 58-60). In regard to the element of returning to ambient temperature, the use of a laser beam in

Ogawa involves the generation of heat: this is the generated heat that thermally decomposes the lower portion of the GaN layer 65 (see column 19 lines 55-60). Thus, the separation step of Ogawa is opposite to that of the present invention.

Furthermore, the ion implantation step of Ogawa is done in order to increase the diameter of the laser beam to have a uniform spatial intensity distribution of the laser beam on the GaN layer (see Ogawa column 19 lines 52-55). In contrast, in the case of the present application, the ion implantation step is done so that a weak area 6 is created (see application page 18 first paragraph). Thus the method of Ogawa is entirely distinct from the method of claim 1.

Beaumont may not be combined with Ogawa to cure the deficiencies of Ogawa with respect to each of the above discussed elements. In particular, Beaumont describes a method for producing an epitaxial GaN layer by:

- depositing on a sapphire substrate a layer functioning as a mask with apertures, (see Beaumont column 3 lines 10-15) and
- growing a GaN layer by epitaxial lateral overgrowth onto said mask, the lateral growth being continued until coalescence of the features of the mask (see Beaumont column 3 lines 16-21).

In Beaumont, the epitaxial lateral overgrowth is done onto a mask, and more particularly in the apertures of the mask (wherein the sapphire substrate is not coved by the mask). Beaumont uses an epitaxial lateral overgrowth technique because the GaN growth, which takes place laterally, allows for obtaining a GaN layer which is not in epitaxial relationship with the sapphire substrate (see Beaumont, column 4 lines 27-31). Thus eptaxial lateral overgrowth on a sapphire substrate is used in Beaumont because there is no epitaxial relationship between the GaN layer obtained and the sapphire substrate.

In contrast, in Ogawa, the epitaxial lateral overgrowth is done on an implanted GaN layer, and not directly on a sapphire substrate. Consequently, a person of ordinary skill in the art would not understand to combine these teachings of Ogawa and Beaumont to arrive at the claimed features. In fact, Beaumont does not teach a step of reworking by lateral overgrowth in order to form a new layer of GaN (step iii of claim 1).

Yoshida teaches a method of manufacturing a semiconductor element comprising the steps of:

- growth of a GAN layer 12 on a substrate 11 (see Figure 1 and column 6 lines 1-3),
- growth of an AlGaN layer 13 on the GaN layer 12 (see Figure 1 and column 6 lines 1-3),
- growth of a GaN layer 14 on the AlGaN layer 13 (see Figure 1A and column 6 lines 5-10).

During the growth of AlGaN layer 13, cracks 20A are produced due to a lattice distortion derived from Al (see column 6 lines 49-53). These cracks 20A weaken the interfaces with the AlGaN layer 13.

In this context, Yoshida teaches separating the GAN layer 14 by applying a stress, said stress consisting in either a sudden decrease of the temperature after growth (see column 7 lines 14017) or a local heat using a laser.

Thus Yoshida teaches that a sudden decrease of the temperature after growth allows for separating a GaN layer 14 when there exist cracks 20A and voids 20B due to the presence of an AlGaN layer 13 between the GaN layer 14 and the substrate 11.

The method of claim 1 does not include an element of involving growing an AlGaN layer 13 comprising crack 20A and voids 20B. Consequently, the skilled person would not have understood the combination of either Ogawa with Yoshida, or Ogawa with Beaumont and Yoshida to lead to predictable results.

Aspar describes a method for the production of a substrate comprising the step of:

- doing an implantation of hydrogen H+ on a substrate of silicon 1 (see Aspar, Figure 1A, and paragraph [0059]) to obtain a weakened zone 4 on the silicon substrate 1,
- bonding the silicon substrate 1 on a support substrate 7 using a glue layer 8 (see Aspar, Figure 1C, and paragraph [0063]),
- separating a thin layer 5 of the silicon substrate using mechanical or thermal means.

Thus, Aspar describes the separation of a thin layer of silicon substrate. It is not mentioned in the description of Aspar that the thermal means include cooling down the

temperature, as recited in amended claim 1. Thus even if Ogawa, Beaumont and Aspar were combined, the combination would not disclose the combination of elements recited in amended claim 1.

In the Action, the Examiner alleges that Aspar teaches "*a method of separating a film from a substrate by implanting hydrogen at 210 KeV at a dose of* $6x10^{16}/cm^2$ *into a GaN substrate and separation by a thermal means.*" See Action, page 5. The Examiner further asserts that "*this clearly suggests separation by cooling from high temperature, which is known in the art to induce stresses capable of separating layers.*"

Applicants respectfully disagree with the Examiner's assertion. In particular, the Examiner may not properly conclude that the expression "using thermal means" would mean "cooling down the temperature" since it could also mean "increasing the temperature."

Thus, for at least the foregoing reasons, Ogawa, Beaumont, Yoshida and Aspar concern technologies having distinct steps for growing layers of different types and therefore upon review, one of ordinary skill in the art would not have recognized that combining the references techniques would have yielded predictable results and resulted in an improved system.

Applicants respectfully submit in the absence of Applicants' specification, one of ordinary skill in the art would not understand to combine the references in the manner alleged by the Examiner to arrive at the claimed combination of elements. As the Examiner is no doubt aware, such hindsight reconstruction is an inappropriate basis for combining the references to render claim 1 obvious.

Thus, for at least the foregoing reasons, claim 1 is not *prima facie* obvious over Ogawa, Beaumont, Yoshida and Aspar. Applicants respectfully request reconsideration and withdrawal of the rejection of claim 1 under 35 U.S.C. §103 over Ogawa, Beaumont, Yoshida and Aspar.

In regard to claims 3-11, 13-19 and 22-23, these claims depend from claim 1 and incorporate the limitations thereof. Thus, for at least the reasons that claim 1 is not *prima facie* obvious over Ogawa, Beaumont, Yoshida and Aspar, claims 3-11, 13-19 and 22-23 are further not obvious over the prior art. Applicants respectfully request reconsideration and withdrawal of

the rejection of claims 3-11, 13-19 and 22-23 under 35 U.S.C. §103 over Ogawa, Beaumont, Yoshida and Aspar.

CONCLUSION

In view of the foregoing, it is believed that all claims now pending, namely claims 1 and 3-23, are now in condition for allowance and such action is earnestly solicited at the earliest possible date. If there are any additional fees due in connection with the filing of this response, please charge those fees to our Deposit Account No. 02-2666. Questions regarding this matter should be directed to the undersigned at (310) 207-3800.

Respectfully submitted,

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CERTIFICATE OF TRANSMISSION

I hereby certify that this correspondence is being submitted electronically via EFS Web to the United States Patent and Trademark Office on October 30, 2007.

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